Remarks:

In the Office Action mailed on November 28, 2007, the Examiner rejected Claims 1, 5-7, 10, 12-17, 19 and 20. Claims 1 and 20 are amended herein to change format and better segregate sub-combinations and related steps. Claims 21-32 are new. Claims 21-32 find support in the specification. In particular, Claims 21-23 capture the embodiment of Figure 4C, Claim 24 captures the embodiment of Figure 6D, Claim 25 captures the embodiment of Figure 7D, Claims 26-28 capture the embodiment of Figure 4B, Claim 29 captures the embodiment of Figure 6B and Claims 30-32 capture the embodiment of Figure 7B. Claims 1, 5-7, 10, 12-17, 19-32 are pending in the application.

35 USC 112, first paragraph

Claims 1, 5-7, 10, 12-17 and 19-20 were rejected under 35 USC 112, first paragraph as being indefinite for failing to comply with the written description requirement. The Examiner states that "the claim(s) contains subject matter which is not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s) at the time the application was filed had possession of the claimed invention. Claims 1 and 20 recite 'an additional layer of silicon that is sealed to the active face of the silicon substrate layer by a sealing layer'. In the specification of 4/16/2001, there is no description of the above 'additional layer of silicon'". (Office Action, Page 3, Lines 6-9). The Examiner further made the incorrect observation that several sections had been struck from the specification. This observation is incorrect in that the struck sections had been replaced by prior amendments. For example, the description from Figure 3B (page 4, lines 30-37) that appear struck, was added in the amendment filed on April 16, 2001.

Accordingly, the missing description of the additional layer of silicon was not missing in the application.

Applicants have submitted herewith a substitute specification that incorporates all the changes made to the specification since the original filing including the amendments

made on April 16, 2001 and herein. Accordingly, it should now be clear that the description of the additional layer of silicon is not missing.

Accordingly, Applicants respectfully request withdrawal of the rejection under 35 USC 112, first paragraph.

35 USC 103

Claims 1, 5-7, 14-17 and 19-20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Orcutt (US 4,712,129), hereinafter Orcutt, in view of Zhang. (US 5,886,364), hereinafter Zhang. Claims 10, 12 and 13 stand rejected under 35 USC 103(a) as being unpatentable over Orcutt, in view of Zhang and further in view of Kobachi, et al., (US 5,811,797), hereinafter Kobachi. Applicants traverse the rejections.

Claim 1

Claim 1 as amended recites:

> A chip for a chip-containing portable article comprising: a silicon substrate layer having an active face with circuits integrated therein defining a central processor unit and memories; and an additional layer of silicon that; is sealed to the active face of the silicon substrate layer by a sealing layer; and covers at least part of said active face; and comprises physical means for providing physical protection against the action of electromagnetic radiation in the infrared range at a wavelength longer than 1 μm.

The Examiner argues in the Office Action of 11/28/2007, hereinafter Office Action, that:

> Orcutt (refer to Figure 1) teaches a chip (12) that is capable of functioning as a chip-containing portable article, the chip comprising a silicon (Col. 1, lines 50-52) substrate layer (substrate layer of chip 12) having an active face with circuits integrated therein (Col. 2, lines 30-33), and an additional layer (18) of silicon (Col. 3, lines 3-5 and 41-42) that is sealed to the active face of the silicon substrate layer by a sealing layer (20), the additional layer of silicon (18) covering at least part of said active face (Col. 2, lines 30-33), the additional layer of silicon comprising physical means for providing physical protection (col. 3, lines 1-3). (Office Action, page 4, lines 9-16).

Further, the Examiner argues that the "[i]ntegraed circuits defining memories and associated central processor units are well known in the art" (Office Action, page 5, lines 1-2). Next, the Examiner argues that "Zhang teaches a semiconductor structure comprising a layer of silicon having a phosphorus dopant concentration of about 10^{20} atoms per cm^3 (Col. 3, lines 31-34), which according to applicant's specification (see page 6, lines 5-24), provides physical protection against the action of electromagnetic radiation in the infrared range at a wavelength longer than 1μm" (Office Action, page 5, lines 8-12). Finally, the Examiner argues:

> [i]t would have been obvious to one of ordinary skills in the art at the time of the invention to modify Orcutt such that the additional layer is a layer of silicon with the above described dopant concentration and thus comprises physical means for protection is such that the physical protection is against the action of electromagnetic radiation in the infrared range at a wavelength longer than 1 μm. The ordinary artisan would have been motivated to modify Orcutt for at least the purpose of providing protection to certain portions of the chip from incident light of the specific wavelengths that the device is expected to be exposed to. (Office Action, page 5, lines 12-19).

Neither Orcutt, nor Zhang, either alone or in combination teach or suggest an additional layer of silicon that comprises "physical means for providing physical protection against the action of electromagnetic radiation in the infrared range at a wavelength longer than 1 μm." The Examiner admits that "Orcutt does not teach that...said additional layer of silicon that comprises physical means for protection is such that the physical protection is 'against the action of electromagnetic radiation in the infrared range at a wavelength longer than 1 μm'." (Office Action, page 4, lines 17-21). The Office Action relies on Zhang for teaching the doping of a silicon layer with phosphorus to a concentration of about 10^{20} atoms per cm^3 (Office Action, page 5, lines 8-9). Zhang fails to teach or suggest that phosphorus as a dopant in silicon

"provides protection against the action of electromagnetic radiation in the infrared range at a wavelength longer than 1 μm." Zhang teaches a thin film transistor that makes up a pixel element in a liquid crystal display, and a process for fabricating the same (Zhang, col. 1, lines 10-22). As an example, Zhang teaches "an amorphous silicon film 12 doped with phosphorous is formed at a thickness of 200-500 Å on a glass substrate 11. The silicon film absorbs light and function mainly as a light shield. The concentration of phosphorous contained in the amorphous silicon is $1x10^{19}$ atoms/cm^3 – $5x10^{21}$ atoms/cm^3, preferably 1-$5x10^{20}$ atoms/cm^3" (Zhang, col. 3, lines 28-34). In Zhang, phosphorous doped silicon acts as a "light shield", but nowhere does Zhang specify the wavelength of light that is shielded. However, Zhang is directed to the creation of "electro-optical display device[s]" (col. 1, line58). As such, the light emitted by the thin film transistors in the liquid crystal display can safely be assumed to be visible light (else the "display" function would be of no use). In this regard, the "light shield" is put in place because "the electric conductivity of the active layer of a TFT increases as light is irradiated thereto, because the active layers are made of a film of amorphous silicon or crystalline silicon which is usually photosensitive" (Zhang, col. 1, lines 25-28). There is, therefore, no reasonable way of interpreting the "light shielding" properties in Zhang to mean "radiation in the infrared range at a wavelength longer than 1 μm". As further proof, it is notable that the Office Action relies on Applicant's specification for teaching that "a layer of silicon having a phosphorus dopant concentration of about 10^{20} atoms per cm^3…provides protection against the action of electromagnetic radiation in the infrared range at a wavelength longer than 1 μm" (Office Action, page 5, lines 8-12). Therefore, neither Orcutt, nor Zhang, either alone or in combination teach or suggest an additional layer of silicon that comprises "physical means for providing physical protection against the action of electromagnetic radiation in the

infrared range at a wavelength longer than 1 μm", and Claim 1 is not obvious over Orcutt in view of Zhang.

Further, given the disclosure of Orcutt, Zhang teaches away from Claim 1. Zhang teaches a "an amorphous silicon film 12 doped with phosphorous … formed at a thickness of 200-500 Å on a glass substrate 11" where "[t]he silicon film absorbs light and function[s] mainly as a light shield" (col. 3, lines 28-32). However, such shielding action is performed well within the completed structure of the thin film transistor, as shown in Figures 1A-1G. This is because the phosphorous doped silicon layer is intended to shield the thin film transistor from light emitted from adjacent thin film transistors (Zhang, col. 1, lines 23-36). On the other hand, Claim 1 requires "a silicon substrate layer having an active face with circuits integrated therein defining a central processor unit and memories; and an additional layer of silicon that is sealed to the active face of the silicon substrate layer by a sealing layer", where the additional layer has "physical means for providing physical protection against the action of electromagnetic radiation in the infrared range at a wavelength longer than 1 μm". As such, Zhang's teaching of phosphorous doped silicon would need to be applied in the formation of the "silicon substrate layer having an active face with circuits integrated therein defining a central processor unit and memories" (i.e., as part of the active structures of the central processor and memories). Therefore, Zhang teaches away from Claim 1, and Claim 1 is not obvious over Orcutt in light of Zhang.

Further, the application of Zhang to the structure of Orcutt would be unfit for the intended purpose of Claim 1. Applicant's disclosure is intended to thwart attackers who use electromagnetic radiation "to cause the transistors … to switch, thereby altering the normal sequencing of operations programmed in the memories of the chip, and … cause the chip to perform

operations that are normally not authorized, thus giving access to secrets without destroying the circuits" (Applicant's Specification as amended, page 2, lines 12-15). On the other hand, application of the phosphorous doped silicon layer of Zhang would render a chip impervious to internally emitted light, but would render no protection from external attack. Therefore, application of Zhang would render Orcutt unfit for the intended purpose of Claim 1, and Claim 1 is not obvious over Orcutt in light of Zhang.

Moreover, there is no teaching, suggestion or motivation to combine Orcutt and Zhang. Orcutt teaches an "integrated circuit device [that] includes a rigid planar member of cover affixed to and overlaying at least a portion of the upper surface of a semiconductor integrated circuit bar. The upper surface of the planar member is textured to lock the member to the encapsulating medium, and has a thermal coefficient of expansion similar to that of the integrated circuit bar" (Orcutt, Abstract). As such, no external attack by means of electromagnetic radiation is envisioned, and no particular treatment of the "rigid planar member" for shielding against electromagnetic radiation is taught or suggested. Further, Zhang makes no mention of electromagnetic radiation in the infrared range and gives no teaching, suggestion or motivation to combine the application of a phosphorous doped silicon layer with any other structure to come up with the structure of Claim 1. Therefore, there is no teaching, suggestion or motivation to combine Orcutt and Zhang, and Claim 1 is not obvious over Orcutt in light of Zhang.

Finally, Orcutt and Zhang are from such disparate technology arts and for such different applications that the combination of Orcutt and Zhang could only be conceived in hindsight. Orcutt relates to semiconductor packaging considerations and shielding against alpha particles (i.e., a helium nucleus – He^{2+}), and hence consists of structures and processes that take place after the circuit features making up the "integrated circuit" have been

processed into the "bar" or substrate (col. 1, lines 13-39). On the other hand, Zhang relates to the creation of thin film transistors on a glass substrate for the making of a liquid crystal display

Claim 20

Claim 20 as amended requires:

> A portable article provided with a chip comprising: a silicon substrate layer having an active face with circuits integrated therein defining a central processor unit and memories; and an additional layer of silicon that; is sealed to the active face of the silicon substrate layer by a sealing layer; and covers at least part of said active face; and comprises physical means for providing physical protection against the action of electromagnetic radiation in the infrared range at a wavelength longer than 1 μm.

The Office Action argues that:

> Orcutt (refer to Figure 1) teaches a chip (12) that is capable of functioning as a chip-containing portable article, the chip comprising a silicon (Col. 1, lines 50-52) substrate layer (substrate layer of chip 12) having an active face with circuits integrated therein (Col. 2, lines 30-33), and an additional layer (18) of silicon (Col. 3, lines 3-5 and 41-42) that is sealed to the active face of the silicon substrate layer by a sealing layer (20), the additional layer of silicon (18) covering at least part of said active face (Col. 2, lines 30-33), the additional layer of silicon comprising physical means for providing physical protection (col. 3, lines 1-3). (Office Action, page 9, lines 5-12).

Claim 20 recites similar limitations as Claim 1, and the language of the rejection of Claim 20 is identical to the language of the rejection of Claim 1. Therefore, by virtue of the arguments presented in response to the rejection of Claim 1, Claim 20 is not obvious over Orcutt in light of Zhang.

Claims 5-7, 10, 12-17 and 19

The dependent Claims 5-7, 10, 12-17 and 19 each depend from Claim 1, inherit the limitations thereof, provide further unique and non-obvious combinations, and are patentable over Orcutt and Zhang for the reasons given in support of the Claim 1 and by virtue of such further combinations.

Claims 10, 12 and 13

Claims 10, 12, and 13 were rejected under 35 USC 103(a) as unpatentable over Orcutt in view of Zhang and in further view of Kobachi. As argued hereinabove Claim 1, from which Claims 10, 12, and 13 depend are patentable over Orcutt and Zhang. Kobachi also fails to teach or suggest "an additional layer of silicon that: is sealed to the active face of the silicon substrate layer by a sealing layer; covers at least part of said active face; and comprises physical means for providing physical protection against the action of electromagnetic radiation in the infrared range at a wavelength longer than 1 μm." Therefore, Claim 1 is patentable over the combination of Orcutt, Zhang and Kobachi. Claim 10, 12, and 13 all depend ultimately from Claim 1 and inherit all the limitations thereof. Therefore, Claim 10 is patentable over the combination of Orcutt, Zhang, and Kobachi for the reasons given in support of Claim 1.

Further, Claim 10 recites:

"A chip according to Claim 1, wherein the physical means for providing physical protection against the action of electromagnetic radiation are formed by surface irregularities."

The Office Action argues that:

Orcutt as modified by Zhang above teaches substantially the claimed structure, but does not teach that the physical means "for providing physical protection against the action of electromagnetic radiation are formed by surface irregularities". Kobachi (refer to Figure 22) teaches a semiconductor chip package wherein a physical means for providing protection against the action of electromagnetic radiation (Col. 15, lines 3-10) are formed by surface regularities (sic) (345). It would have been obvious to one of ordinary skills in the art at the time of the invention to

> modify Orcutt such that the physical means for providing physical protection against the action of electromagnetic radiation are formed by surface irregularities. The ordinary artisan would have been motivated to modify Orcutt for at least the purpose of using the irregularities to scatter the unwanted incident electromagnetic radiation (Col. 15, lines 3-10) and thus protect the device from the said electromagnetic radiation.

The Office Action admits "Orcutt as modified by Zhang above … does not teach that the physical means 'for providing physical protection against the action of electromagnetic radiation are formed by surface irregularities'" (Office Action, Page 10, lines 4-6). The Office Action relies on Kobachi for teaching "a semiconductor chip package wherein a physical means for providing protection against the action of electromagnetic radiation are formed by surface [irregularities][1] (Office Action, page 5, lines 8-9).

Claim 10 depends from Claim 1 inherit the limitations thereof, provide further unique and non-obvious combinations, and is patentable over the prior art for the reasons given in support of the Claim 1 and by virtue of such further combinations.

Further, Kobachi does not teach or suggest a semiconductor package where in "a physical means for providing protection against the action of electromagnetic radiation are formed by surface irregularities" (Claim 10). In fact, Kobachi is not concerned with protection against electromagnetic radiation at all. Kobachi is concerned with the "problem of reduction in S/N ratio caused by direct light incidence on the light receiving elements…" (Col 3, lines 12-15). While Kobachi does state that "an irregular structure (345) having a plurality of irregularities on the outer surface of the package (219), as the light shielding and absorbing structure, for scattering external light or

[1] The Office Action states "surface regularities (345)" page 10, line 9. Applicant assumes the Examiner meant "irregularities" here and have changed it as such.

internal leakage light." (Col 15, lines 4-7), this is no way relates to the Applicant's invention which is aimed at protecting a semiconductor chip from electromagnetic radiation as Kobachi's goal is "a photoreflective detector for improving the S/N ratio as a result of preventing direct light incidence on a light receiving element ..." (Col 5, lines 22-24).

Applicant would like to point out that like Orcutt and Zhang, Kobachi is also from such a disparate technology art and for such a different application, with respect to Orcutt and Zhang, that a person of ordinary skill would not be lead to create the combination of Orcutt, Zhang and Kobachi.

CONCLUSION

It is submitted that all of the claims now in the application are allowable. Applicants respectfully request consideration of the application and claims and its early allowance. If the Examiner believes that the prosecution of the application would be facilitated by a telephonic interview, Applicants invite the Examiner to contact the undersigned at the number given below.

Applicants respectfully request that a timely Notice of Allowance be issued in this application.

Respectfully submitted,

Date: January February 27, 2008

/Pehr Jansson/
Pehr Jansson
Registration No. 35,759

The Jansson Firm
9501 N. Capital of TX Hwy. #202
Austin, TX 78759
512-372-8440
512-233-2447 (Fax)
pehr@thejanssonfirm.com